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ABSTRACT

The Defense Economic Impact Modeling System (DEIMS) analyzes the economic effect of defense expenditures on the United States economy by using a consistent, reliable framework of economic models and government policy assumptions. Planning information on defense requirements is also provided to private sector firms. The DEIMS allows the Department of Defense to analyze the impact of alternative defense budgets on key industrial sectors, skilled labor categories, and raw material requirements at a level of product disaggregation consistent with the Department of Commerce's four-digit Standard Industrial Classification categories. It combines (1) a macroeconomic model adapted to integrate the impact on key industrial sectors of specific defense production requirements; (2) a producer price modeling system; (3) a 400 sector, commodity-based, input-output and employment model; (4) a 161 category skilled-lab or requirements model; and (5) a 72-commodity, quantity-based, strategic materials requirements model. All models are maintained by Data Resources, Inc. DEIMS output display tables are designed to provide forecasts of future defense needs and thus stimulate more active competition among companies. (Sample tables and listings of sectors, skill categories, and strategic materials requirements covered in the model are appended.) (YLB)

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* Specific material on the Defense Economic Impact Modeling System as listed in Appendices I through III can be obtained from the Defense Industrial Resources Support Office as listed above.

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THE DEFENSE ECONOMIC IMPACT MODELING SYSTEM

by

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The Defense Economic Impact Modeling System (DEIMS) has been developed by the Department of Defense to serve three basic purposes:

- To analyze the economic impact of defense expenditures on the United States economy using a consistent and reliable framework of economic models and government policy assumptions.
- To provide planning information on defense requirements to private sector firms in order to alert these companies to sales opportunities as well as to encourage companies to add additional capacity where needed.
- To allow the Department of Defense to analyze the impact of alternative defense budgets on key industrial sectors, skilled labor categories, and raw material requirements.

The Defense Economic Impact Modeling System (DEIMS) is a large integrated economic modeling system. It allows the Department of Defense to analyze the impact of the defense budget by detailed industry and service sectors at a level of product disaggregation consistent with the Department of Commerce's 4-digit Standard Industrial Classification (SIC) categories. It combines a commercially available macroeconomic model that has been adapted to integrate fully the impact on key industrial sectors of specific defense production requirements; a very detailed producer-price-modeling system; a 400 sector, commodity-based (rather than industry based)*, input-output and employment model; a 161 category skilled-labor requirements model; and a 72 commodity, quantity based, strategic materials requirements model. All of these models are maintained by Data Resources, Inc., a privately-owned economic forecasting organization. DEIMS forecasts for non-defense activity are thus a product of the current DRI control forecast and the current DoD estimate of defense outlays by year and by product consumed. All assumptions with respect to fiscal and monetary policy, current trends in prices, wages, industrial output, and technological change factor are those of Data Resources. As defense spending assumptions are those of DoD, the resulting forecast represents the DRI view of the world tempered by DoD developed defense policy assumptions.

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*In 1972, for example, 95% of the production of companies classified as part of the guided missile industry was due to the production of guided missiles and space vehicles (a single commodity classification). The remaining production of firms included in the guided missile industry was in radio and TV communications equipment i.e., specialized defense electronics (1%); and in aircraft and parts (4%). The DRI input-output model is based on commodity rather than industry categories thus DoD purchases of guided missiles are related only to the 95% of the guided missile industry producing guided missiles.

Approach and Methodology

To insure that the defense expenditures projected by industrial and service sectors are realistic, the Department of Defense starts with the latest forecast of the Five Year Defense Program (FYDP) available. The defense budget is a planning budget, thus all accounts reflect the cost to complete specific projects measured in constant, not current, dollars. As decisions are made by the Secretary of Defense as to which programs to include in the FYDP, changes are made in the funds allocated to individual budget categories (See Chart 1 for the list of the 50 primary budget accounts used by DEIMS). For example, the change in the basing mode for the MX missile affected the amount of funding in the Air Force Military Construction and Missile procurement accounts.

While the DoD planning budget indicates program costs in terms of TOA, the amount of money needed to complete the planned procurement contract, business decisions must be based on actual contracts let and purchases made. To translate TOA accounts into the pattern of actual expenditures (including progress payments), a special TOA-to-Outlay translation model has been developed.*

DEIMS's key innovation has been to develop a method of translating DoD budget outlays by major DoD budget accounts into Commerce Department industrial and service categories. Fixed share translation vectors for each budget category are multiplied year-by-year with DoD developed estimates of likely constant dollar expenditures for each budget category. By summing across all 50 categories, a unique pattern of defense final demand by 4-digit Standard Industrial Classification groups is developed. It reflects the current planning baseline (FY83-87) as well as previously approved, but yet unspent defense authorizations (FY82 and before).

Chart 2 illustrates exactly what one of these defense budget category translator vectors looks like. It shows that for Naval Aircraft procurement (one of the 50 budget accounts) not all of the money spent goes directly to the primary airframe manufacturers. Within the budget category are funds used to purchase common ground equipment, spare parts, capital equipment, as well as fighter aircraft, transport aircraft, and helicopters. Much of the special equipment, including mission specific avionics, is purchased separately by the government and is not standard on commercial or military aircraft. Thus, for military aircraft categories, the amount available has to be further sub-divided between several separate producing sectors: other ordnance and accessories, radio and tv communications equipment (the category into which

*For example, the Navy Shipbuilding procurement category spends money far more slowly than the Air Force Aircraft procurement category. In addition, there is a lag between the time the defense appropriations bill is signed by the President, the time when the actual government contract is signed for aircraft, missile, or ship, and the date when the first progress payments are made.

most specialized military electronics is grouped), aircraft engines and engine parts, aircraft parts and equipment, and measuring and control equipment. Each major category of aircraft has its own unique pattern of final demand (i.e., a combat fighter differs from transport aircraft in body armaments and electronics).

A mapping such as the one shown in Chart 2, has been developed for each of the fifty budget categories identified in Chart 1. Chart 3 illustrates, for the new Reagan defense program, how the share of total DoD expenditures (all commodities share sum to unity) going directly to a selected list of final demand categories changes over time.

Revised DEIMS Translator

The DEIMS translator is a constantly changing view of how defense spending impacts the economy. It is an attempt to indicate likely flows of resources and thus may not fit exactly with long held statistical conventions used by the Department of Commerce and other government agencies. The basic approach has been to deviate from such statistical conventions when it is apparent that the basic economic model used, the input-output model, fails to reflect the true pattern of indirect demand associated with a DoD purchase. For example, in the original DEIMS translator nearly all of DoD demand for complete guided missiles was included in this sector (45). It was assumed that the indirect demand for propellants (161), guidance and control electronics (291 and 322), and rocket engines (336) would be approximated by the coefficients within the input-output model itself. As it turned out, that model failed to reflect the known indirect demand for such components primarily because the input-outut model, in as specialized an area as guided missiles tends not to be very accurate. To overcome such problems I have modified the DEIMS translator in order to reflect special knowledge of the actual mix of components within different service categories of missiles and weapons. As a result, however, the new DEIMS translator's value of complete guided missiles mainly reflects the value-added (work completed in the missile sector itself excluding inputs received of propellants, some electronics, and rocket engines). Thus the old DEIMS translator and the new are not readily comparable. A similar story is appropriate for tanks and tank components where the inclusion of the inputs specific to the M-1 Abrams tank program reduced the value attributed to the primary sector (tanks and tank components) while increasing the value attributed in some of the key factor input sectors such as iron and steel, electronics and turbine engines.

DoD purchases of automatic test equipment of all types were allocated to measuring and control instruments (346). At least some of this equiment should be classified in DRI sectors 322 and 301. If demand had been allocated to 322 it would have been indistinguishable within this category.

There is more detail given in the new and a more careful translation was made of DoD programs to insure that the new, revised forecast should be a better measure of the impact than the old DEIMS forecast. We will continue to modify the translator as more information is made available and as feedback is received from industry.

Integrating DoD Final Demand with Economic Models

We can now start to analyze the impact of our program on the private economy. Utilizing the economic models developed and maintained by Data Resources, Inc., we can simulate over the period covered by the current defense plan (1981-87) the effect of our spending on sectors supplying our needs directly (identified by the defense final demand forecast for each year) and also on those who supply our needs indirectly. Aside from relating defense spending to the standard macroeconomic variables -- Gross National Product, the unemployment rate, the overall price level, interest rates, and private-non-residential investment, we can now relate defense spending to a variety of industry and service specific measures such as industry production, prices and employment. For a detailed listing of the sectors above to be analyzed using this model see Appendix 1.

The DRI input-output model reflects current patterns of inter-industry supply. While based on the 1972 Commerce Department input-output model, it has been updated and made dynamic in order to reflect shifts occurring in technology over time. Aside from the DRI input-output model, DEIMS also utilized the DRI developed sector employment model. This model forecasts employment by industry or service sectors taking into account production, relative prices, wages and productivity trends.

Estimates from this employment model are integrated with the Bureau of Labor Statistics; skilled-labor demand pattern for 1980 and 1990 (forecasts for intervening years are interpolated). One hundred sixty-one skilled-labor categories have been chosen for display and these cover all specialized trades and occupations included in the more detailed BLS categorization of employment skills in the U.S. For a detailed listing of the skilled-labor categories included in DEIMS see Appendix 2A. Seventy-four industrial sectors were also selected from a more detailed BLS categorization and are listed in Appendix 2B.

Estimates for consumption of primary metals are developed using sector production estimates derived from the input-output model and coefficients that relate quantity of a commodity consumed to dollars of sector production. These were developed at the detailed sector-specific commodity level for the period 1977 to 1979. Commerce Department and Bureau of Mines "first use after processing" data bases were used, and fixed, average relationships for that three year period were developed (rather than the quantity consumed to dollars of production share changing over time) for each primary commodity and 4-digit SIC industry user. Thus changes forecast in the quantity demanded for a raw material can be assumed to be solely a function of the change in the production for the consuming industry rather than to a change in the technical relationship itself. Appendix 3 provides a listing of the key primary products included in DEIMS.

CHART 1

DEFENSE EXPENDITURE CATEGORIES

NO.	NAME
	MILITARY PERSONNEL
1	ARMY
2	NAVY
3	MARINE CORPS
4	AIR FORCE
5	ARMY RESERVE
6	NAVY RESERVE
7	MARINE CORPS RESERVE
8	AIR FORCE RESERVE
9	ARMY NATIONAL GUARD
10	AIR FORCE NATIONAL GUARD
11	RETIRED PAY, DEFENSE
	OPERATIONS AND MAINTENANCE
12	ARMY
13	NAVY
14	MARINE CORPS
15	AIR FORCE
16	DEFENSE AGENCIES
17	ARMY RESERVE
18	NAVY RESERVE
19	MARINE CORPS RESERVE
20	AIR FORCE RESERVE
21	ARMY NATIONAL GUARD
22	AIR NATIONAL GUARD
	PROCUREMENT
	ARMY
28	AIRCRAFT
29	MISSILES
30	WEAPONS AND TRACKED VEHICLES
31	AMMUNITION
32	OTHER

NO.	NAME
	PROCUREMENT (CONT'D)
	NAVY
33	AIRCRAFT
34	WEAPONS
35	SHIPS AND CONVERSIONS
36	OTHER
37	MARINE CORPS
	AIR FORCE
38	AIRCRAFT
39	MISSILES
40	OTHER
41	DEFENSE AGENCIES
	RESEARCH, DEVELOPMENT, TEST AND EVALUATION
42	ARMY
43	NAVY
44	AIR FORCE
45	DEFENSE AGENCIES
	MILITARY CONSTRUCTION
46	ARMY
47	NAVY
48	AIR FORCE
49	DEFENSE AGENCIES
50	ARMY NATIONAL GUARD
51	AIR NATIONAL GUARD
52	ARMY RESERVE
53	NAVY RESERVE
54	AIR FORCE RESERVE
55	FAMILY HOUSING

CHART 2

TYPICAL DEIMS TRANSLATOR VECTOR

NAVY AIRCRAFT PROCUREMENT

50	OTHER ORDNANCE & ACCESSORIES	1.97%
291	ELECTRONIC COMPUTING EQUIPMENT	4.90
322	RADIO & TV COMMUNICATION EQUIPMENT	21.70
335	AIRCRAFT	34.90
336	AIRCRAFT ENGINES & ENGINE PARTS	8.70
337	AIRCRAFT PARTS & EQUIPMENT, NEC	6.77
346	MEASURING & CONTROL INSTRUMENTS	9.75
375	WHOLESALE TRADE	1.78
	ALL OTHER	9.53
	TOTAL OUTLAYS	100.00%

CHART 3

DEFENSE ECONOMIC IMPACT MODELING SYSTEM (DEIMS)

DOD FINAL DEMAND SHARE (%)

SIC #	Selected Industry and Service Sector	1980	1981	1982	1983	1984	1985	1986	1987
3761	COMPLETE GUIDED MISSILES	2.1	2.2	2.3	2.4	2.5	2.6	2.6	2.6
3483	AMMUNITION, EXC. SMALL ARMS	1.4	1.4	1.4	1.5	1.6	1.7	1.8	1.9
3795	TANKS & TANK COMPONENTS	.3	.3	.4	.4	.5	.5	.5	.5
3489	OTHER ORDNANCE & ACCESSORIES	.7	.7	.7	.7	.8	.8	.8	.8
3573	ELECTRONIC COMPUTING EQUIP.	2.6	2.5	2.5	2.8	3.0	3.1	3.2	3.3
3661	TELEPHONE & TELEGRAPH EQUIP.	.2	.2	.2	.2	.2	.3	.2	.2
3662	RADIO & TV COMMUNICATIONS EQUIP.	9.4	9.5	9.7	10.4	11.0	11.5	11.8	12.0
3711	MOTOR VEHICLES*	.9	1.0	1.0	1.2	1.3	1.3	1.3	1.4
3721	AIRCRAFT	4.5	4.6	4.8	5.3	5.8	6.2	6.4	6.4
3724	AIRCRAFT ENGINES & PARTS	1.7	1.7	1.7	1.8	1.8	1.9	1.9	1.9
3731	SHIPBUILDING & REPAIRING	4.0	4.1	3.8	3.8	3.9	3.7	3.7	3.8
732-9	MISCELLANEOUS BUSINESS SERVICES	1.6	1.6	1.7	1.7	1.7	1.7	1.7	1.7
	ALL OTHER INDUSTRIES SECTORS	22.9	23.0	23.7	23.8	23.9	24.2	24.4	24.5
	PAY (CIVILIANS, MILITARY, RETIRED)	45.8	45.3	44.1	41.9	39.9	38.4	37.4	36.7
TOTAL DOD EXPENDITURES		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

NOTE: BASED ON REAGAN BUDGET, FEBRUARY 1982 AND JUNE 1982 DEIMS TRANSLATOR. SHARES CALCULATED USING $ 1982 prices.

*INCLUDES INFANTRY FIGHTING VEHICLES.

CHART 4

DEFENSE ECONOMIC IMPACT MODELING SYSTEM
INDUSTRY DETAILED OUTPUT TABLE

CROSS REFERENCE GUIDE

Aggregate Budget Categories	DoD Budget Categories Combined (Category #)
Military Personnel	Military Personnel (1- 10)
Operations and Maintenance	Operations and Maintenance (12 - 22)
Aircraft Procurement	Army Aircraft (28), Navy Aircraft (33), Air Force Aircraft
Missile Procurement	Army Missiles (29), Navy Weapons (34), Air Force Missiles (40)
Weapons and Tracked Vehicles	Army Weapons and Tracked Vehicles (30)
Ammunition Procurement	Army Ammunition (31)
Ships and Conversion	Navy Ships and Conversion (35)
Other Procurement	Army Other (32), Navy Other (36), Marine Corp (37), Air Force Other (41), Defense Agencies (41)
Research, Development, Test and Evaluation	Research, Development, Test and Evaluation (42 - 45)
Military Construction and Family Housing	Military Construction (46), Family Family Housing (55)

Aggregate Industry Groups	DRI Sectors (SCI #)
Missiles	45 Complete Missiles (3761)
Ammunition	46 Ammunition, Except Small Arms (3483), 49 Small Arms Ammunition (3482)
Tanks and Tank Components	47 Tanks and Tank Components (3795)
Other Ordnance	50 Other Ordnance and Accessories (3489)
Communications Equipment	321 Telephone and Telegraph Equip. (3661) 322 Radio and Television Communications Equipment (3662) Electronic and Electronic Equipment except Communications Equipment

Aircraft and Parts	335 Aircraft (3721) 337 Aircraft Parts and Equipment (3728)
Aircraft Engines and Engine Parts	336 Aircraft Engines and Engine Parts (3724)
Shipbuilding	338 Shipbuilding and Repairing (3731)
All Other	Remaining sectors final demand defense

Aggregate Armed Service Categories

Army	Army Aircraft, (28) Army Missiles (29), Army Weapons and Tracked Vehicles (30), Army Ammunition (31), Army Other (32), Army RDT&E (42)
Navy	Navy Aircraft (28), Navy Weapons (34), Navy Ships and Conversions (35), Navy Other (36, Marine Corp (37) Navy RDT&E (43)
Air Force	Air Force Aircraft (39), Air Force Missiles (40), Air Force Other (41), Air Force RDT&E (44)
Foreign Military Sales	Production associated with exports of new defense equipment contracted for by foreign governments but managed by DoD contract monitors

DEIMS Summary Tables

DEIMS output display tables have been designed to be informative to economists and non-economists alike. In early discussions with companies in the private sector, we discovered that additional detail showing the demand for their firm's output relative to specific types of defense procurement would be more useful than simply showing a single defense final demand impact on their sector's sales of a certain commodity. For example, the aluminum industry pointed out that different types of aluminum products are used in building aircraft than are used in producing infantry fighting vehicles. To accommodate the demand for more end-use detail, two different industry and service sector summary tables have thus been developed. The first, Table 1, provides an overview of the final demand pattern for the commodity in question as well as the derived production for defense and non-defense purposes. Table 2 provides a more detailed summary of defense production indicating how much of the total is associated with different categories of DoD final demand. Chart 4 indicates the aggregate budget categories and industry groups used to develop Table 2's results.

Tables 1 and 2 are available for each of the 400 sectors included within the DRI input-output and employment model. Final demand represents direct consumption by final users: individuals (personnel consumption expenditures); corporations and private investors (business and residential investment); foreign buyers for civilian goods and military goods (exports and FMS), or government (defense, non-defense federal, and state and local). Imports are indicated and are subtracted from total consumption, investment, exports, and government final demand, thus total demand for a commodity is net of imports (it is possible to have negative final demand for a commodity).

As imports are provided from abroad domestic production is diminished by the value of foreign-made objects. The addition of all industry and service sectors yields approximately the level of Gross National Product (GNP) for the full United States economy.

Domestic production represents the sum of final and intermediate* demand for each industrial commodity or service sector's output. Production, measured in dollars, is conceptually the same as reported industry sales for the commodity itself. Table 1 distinguishes between production associated with defense final demand, production due to military export sales (foreign military contracts sales only), and production associated with non-defense spending.

All three of these have been adjusted to reflect the likely foreign import content using a simplifying assumption that for defense production the import content share is the same as the import share of total apparent domestic consumption of the commodity.** Total requirements for defense represents the defense production estimate unadjusted for imports, while the import share indicates the degree of foreign penetration of the U.S. domestic

*An intermediate good is a factor input such as steel, aluminum, forgings, etc.

**Apparent consumption is assumed to be equal to domestic production plus imports minum exports (the reverse of the GNP formula).

market. Also shown is the percentage of each sector's total production accounted for by defense production. Employment associated with defense and non-defense production is also displayed. Productivity measures the production per worker employed and the average annual percentage growth measures the rate of productivity growth forecast for that sector.

Table 2 provides further detail for some of the informaiton included in Table 1. Production associated with defense final demand is now displayed in two different ways -- by aggregate budget categories and by aggregate industry groups. The first group relates the supplying sector's output to specific DoD budget expenditures. As Chart 2 illustrated the aircraft procurement activity buys directly from more than simply the aircraft industry (for example, from other ordnance and accessories and radio tv and comunications equipment). For example, an electronic component manufacturer whose products are used primarily in avionics for fighter aircraft would relate his expected growth in demand to the growth associated with the aircraft procurement category. The second set of final demand categories relates the supplying sector's output to final defense demand coming from specific industry groups. The demand for communications equipment used on aircraft, ships, and in missile support batteries is now summed to produce an estimate of total defense demand for electronic communications devices, guidance systems, and specialized sensors. A producer of aluminum-heat-treated plate may find demand projected by the aircraft sector of interest as it reflects the pure demand of only the airframe and aircraft parts companies and not that of the aircraft engines and engine parts firms. Aluminum products used by other jet defense prime contractor sectors such as radio and communications equipment or the other ordnance and accessories are also displayed separately.

Table 3 illustrates how DEIMS analyzes skilled-labor demand by job categories and industrial sectors. Two versions of Table 3 exist -- one showing demand by skill category with industries using a single skilled-labor category listed vertically; the other by industry with all 161 skilled labor demands listed vertically. Both defense and non-defense demand are presented.

Table 4 illustrates the type of detail available for each of the 72 strategic raw materials currently included in the Strategic Materials Requirements Model. Information is arrayed by consuming industry. The industry first using the material is the only one indicated so there is no double counting for an individual primary commodity.

Influencing the Civilian Market Place

Economists believe that the best way to influence market place behavior is to send proper signals as to the demand to be expected. The approach we have taken in order to insure there is adequate industrial capacity to meet our growing defense requirements is to provide the best quality forecasts of our future needs freely to private sector concerns in advance of our orders. Our purpose than is to indicate, to the private market, which sectors are likely to be the fastest growing; which professions should be in the greatest demand; and which strategic materials could well be consumed in record quantities.

Our purpose is to interest companies in competing more actively for our business in this growing defense market place. Companies selling products to defense may also utilize this information in order to better plan their capital requirements so that future periods' growth can be anticipated and capital can be available and in place when needed. As more firms seek, and win, defense contracts -- directly and as subcontractors -- they will be forced to improve their quality control standards and to update their technology bases. Both of these steps insure such firms will be healthier and more dynamic.

DEIMS is a first step in efforts to improve the planning process in American industry. The Department of Defense is taking the lead in this effort because we recognize that without an adequate, stable, and healthy industrial base, national security goals cannot be achieved. We hope that the information freely provided by the Department will serve as a guide to private firms interested in broadening their customer bases; diversifying into new and growing commercial areas; and expanding and/or modernizing their capital plant and equipment. Forecasts are also being provided to the Department of Labor and to other educational and training organizations in order to encourage more new job entrants to consider learning skills and disciplines that are likely to be in the greatest demand in the future.

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TABLE 1

305. INDUSTRIAL CONTROLS

DEFENSE ECONOMIC IMPACT MODELING SYSTEM
FORECAST OF THE IMPACTS OF DEFENSE EXPENDITURES ON INDUSTRY OUTPUT
(MILLIONS OF 1981 DOLLARS EXCEPT AS NOTED)

	1981	1982	1983	1984	1985	1986	1987	AVG. ANN. % GROWTH 81 TO 87
FINAL DEMAND	879	705	832	945	1,034	1,113	1,168	4.87
PERSONAL CONSUMPTION	0	0	0	0	0	0	0	--
INVESTMENT	558	421	544	631	694	748	789	5.95
EXPORTS (CIVILIAN)	298	252	255	278	301	323	337	2.10
FOREIGN MILITARY SALES (FMS)	0	0	0	0	0	0	0	--
IMPORTS (-)	33	32	33	35	39	43	47	6.05
IMPORTS FOR DEFENSE	2	3	3	3	4	4	5	13.83
GOVERNMENT PURCHASES	56	64	66	70	77	84	89	7.98
DEFENSE	25	33	38	44	51	57	62	16.38
NONDEFENSE FEDERAL	26	26	23	21	21	21	21	-3.21
STATE & LOCAL	5	5	5	5	5	5	5	0.79
DOMESTIC PRODUCTION	3,816	3,399	3,785	4,189	4,536	4,856	5,081	4.89
PROD. FOR DEFENSE	232	260	308	355	404	449	478	12.81
PROD. FOR FMS	18	18	18	18	18	18	18	0.54
ALL OTHER	3,567	3,121	3,459	3,816	4,113	4,389	4,585	4.27
DEFENSE SHARE OF DOM. PROD.(%)	6.08	7.66	8.14	8.47	8.91	9.24	9.41	7.56
DEFENSE TOTAL REQUIREMENTS	234	263	311	358	408	453	483	12.82
IMPORT SHARE(%)	0.93	1.00	0.93	0.90	0.90	0.94	0.98	0.89
EMPLOYMENT (THOUS.)	55	50	51	55	57	60	61	1.66
EMPLOYMENT FOR DEFENSE	3	4	4	5	5	6	6	9.34
EMPLOYMENT FOR FMS	0	0	0	0	0	0	0	-2.56
ALL OTHER	52	46	47	50	52	54	55	1.06
PRODUCTIVITY ($1000/PERSON)	69	69	74	76	79	82	83	3.18

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TABLE 2

305. INDUSTRIAL CONTROLS

DEFENSE ECONOMIC IMPACT MODELING SYSTEM
IMPACTS OF DEFENSE EXPENDITURES ON INDUSTRY OUTPUT
DETAILED INDUSTRY REPORT
(MILLIONS OF 1981 DOLLARS EXCEPT AS NOTED)

	1981	1982	1983	1984	1985	1986	1987	AVG. ANN. % GROWTH 81 TO 87
TOTAL DOMESTIC PRODUCTION	3,816	3,399	3,785	4,189	4,536	4,856	5,081	4.89
TOTAL PRODUCTION FOR DEFENSE	232	260	308	355	404	449	478	12.81
PRODUCTION FOR DEFENSE BY AGGREGATE BUDGET CATEGORY								
MILITARY PERSONNEL	2	2	2	2	2	2	2	2.16
OPERATIONS & MAINTENANCE	53	65	67	69	74	79	81	7.22
AIRCRAFT PROCUREMENT	33	37	47	57	68	77	81	15.90
MISSILE PROCUREMENT	17	19	25	31	38	42	45	17.51
WEAPONS & TRACKED VEHICLES	4	5	7	8	9	9	10	13.79
SHIPS & CONVERSIONS	29	29	34	40	42	45	50	9.24
AMMUNITION PROCUREMENT	6	6	8	9	10	12	13	14.63
OTHER PROCUREMENT	47	53	67	79	94	108	120	17.00
RESEARCH, DEVEL. TEST & EVAL.	34	37	43	49	55	59	61	10.45
MILITARY CONSTRUCTION & OTHER	7	7	9	11	13	15	16	15.75
PRODUCTION FOR DEFENSE BY AGGREGATE INDUSTRY GROUPS								
MISSILES	1	2	2	2	3	3	3	11.71
AMMUNITION	2	2	2	3	3	3	4	13.80
TANKS & TANK COMPONENTS	1	1	1	1	1	2	2	13.17
OTHER ORDNANCE	1	1	1	1	1	1	1	12.61
COMMUNICATIONS EQUIPMENT	12	14	17	20	23	26	28	14.87
OTHER ELECTRONIC EQUIPMENT	86	102	122	144	167	187	202	15.20
MOTOR VEHICLES	2	2	3	4	4	4	5	13.27
AIRCRAFT & PARTS	8	9	11	13	15	17	18	15.01
AIRCRAFT ENGINES &PARTS	2	2	2	3	3	3	4	10.94
SHIPBUILDING	42	43	47	52	55	58	62	6.64
ALL OTHER	75	83	99	113	129	143	151	12.38
PRODUCTION FOR DEFENSE BY ARMED SERVICE BRANCH								
ARMY	32	37	46	55	62	69	74	15.29
NAVY & MARINE CORPS	65	67	79	92	102	113	121	10.93
AIR FORCE	63	71	90	106	126	144	154	15.98
PRODUCTION FOR FOREIGN MILITARY SALES	18	18	18	18	18	18	18	0.54

12/23/81

TABLE 3

DEFENSE ECONOMIC IMPACT MODELING SYSTEM
OCCUPATION BY INDUSTRY MODEL
ESTIMATES OF INDUSTRIAL EMPLOYMENT BY OCCUPATION
1. AERO-ASTRONAUTIC ENGINEERS
(THOUSANDS OF PERSONS)

INDUSTRY	81	82	83	84	85	86	87	AVG. ANN. %GROWTH 81 TO 87
DEFENSE INDUCED EMPLOYMENT								
8. ORDNANCE & ACCESSORIES	3.66	3.79	4.19	4.46	4.74	5.09	5.31	6.39
35. ELECTRICAL MACH. & EQUIP.	0.11	0.11	0.12	0.13	0.13	0.14	0.13	3.02
37. AIRCRAFT INCL. PARTS & EQUIP.	16.48	18.84	21.33	23.36	25.96	29.30	31.12	11.18
47. AIR CARRIERS & RELATED SERV.	0.04	0.04	0.05	0.05	0.05	0.06	0.06	8.58
61. BUSINESS SERVICES NEC	0.04	0.04	0.05	0.05	0.05	0.06	0.06	10.07
63. MISC. PROFESSIONAL SERVICES	0.05	0.05	0.06	0.06	0.07	0.07	0.07	6.35
73. GOVERNMENT	3.51	3.55	3.62	3.62	3.66	3.66	3.67	0.73
TOTAL, ALL INDUSTRIES	24.03	26.58	29.58	31.89	34.84	38.56	40.62	9.14
TOTAL EMPLOYMENT								
8. ORDNANCE & ACCESSORIES	4.91	4.92	5.24	5.46	5.72	6.07	6.32	4.29
35. ELECTRICAL MACH. & EQUIP.	0.74	0.70	0.70	0.68	0.67	0.67	0.66	-1.92
37. AIRCRAFT INCL. PARTS & EQUIP.	41.17	42.43	46.28	49.32	52.80	57.09	60.43	6.60
47. AIR CARRIERS & RELATED SERV.	1.04	1.03	1.09	1.13	1.18	1.24	1.29	3.68
61. BUSINESS SERVICES NEC	0.73	0.73	0.77	0.80	0.84	0.89	0.92	3.98
63. MISC. PROFESSIONAL SERVICES	1.60	1.52	1.53	1.52	1.51	1.53	1.52	-0.90
73. GOVERNMENT	13.05	12.88	12.85	12.94	13.19	13.55	13.98	1.15
TOTAL, ALL INDUSTRIES	65.10	66.02	70.33	73.74	77.86	83.06	87.16	4.98

TABLE 4

1/24/82

DEFENSE ECONOMIC IMPACT MODELING SYSTEM
STRATEGIC MATERIAL REQUIREMENTS MODEL
FORECAST FOR:
49. PLATINUM
(THOUSANDS OF TROY OUNCES)

INDUSTRY	1981	1982	1983	1984	1985	1986	1987	AVG. ANN. %GROWTH 81 TO 87
DEFENSE INDUCED CONSUMPTION								
161. INORGANIC & ORGANIC CHEM	3.63	4.23	4.79	5.29	5.85	6.46	6.91	11.33
181. PET. REFINING & RELATED PROD	4.55	5.12	5.56	5.89	6.33	6.81	7.20	7.92
196. GLASS & PROD EX CONTAINERS	2.23	2.60	3.02	3.47	3.94	4.44	4.73	13.35
305. INDUSTRIAL CONTROLS	3.54	4.05	4.73	5.37	6.05	6.80	7.20	12.56
321. TELEPHONE & TELEGRAPH EQUIP	0.39	0.44	0.50	0.58	0.64	0.73	0.79	12.61
322. RADIO & TV COMMUNICATION EQUIP	14.40	16.52	19.48	22.13	25.11	28.29	29.96	12.99
334. MOTOR VEHICLE PARTS & ACCESS.	14.07	16.44	19.26	22.32	24.52	27.19	28.81	12.69
349. DENTAL EQUIP & SUPPLIES	0.82	0.84	1.05	1.20	1.39	1.55	1.65	12.25
354. JEWELRY, PRECIOUS METAL	0.08	0.09	0.11	0.12	0.13	0.14	0.15	12.00
TOTAL, ALL INDUSTRIES	43.71	50.32	58.50	66.37	73.96	82.42	87.39	12.24
TOTAL								
161. INORGANIC & ORGANIC CHEM	116.27	122.08	128.00	133.95	140.57	146.72	153.13	4.70
181. PET. REFINING & RELATED PROD	114.45	115.31	117.47	118.83	120.05	121.87	123.32	1.25
196. GLASS & PROD EX CONTAINERS	78.95	85.66	88.19	91.91	96.87	102.26	107.39	5.26
305. INDUSTRIAL CONTROLS	77.10	82.86	89.10	93.90	99.53	105.31	110.61	6.20
321. TELEPHONE & TELEGRAPH EQUIP	6.57	7.18	7.91	8.45	9.21	9.93	10.87	8.77
322. RADIO & TV COMMUNICATION EQUIP	28.44	30.60	34.49	37.87	41.48	45.36	47.86	9.06
334. MOTOR VEHICLE PARTS & ACCESS.	616.55	679.25	704.62	732.70	767.20	809.09	848.64	5.47
349. DENTAL EQUIP & SUPPLIES	39.40	40.99	42.77	44.82	48.12	51.03	53.62	5.27
354. JEWELRY, PRECIOUS METAL	26.68	29.56	30.72	31.77	33.81	35.70	37.80	5.98
TOTAL, ALL INDUSTRIES	1,104.41	1,193.48	1,243.27	1,294.21	1,356.85	1,427.28	1,493.24	5.16

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APPENDIX I

INPUT-OUTPUT MODEL
400-SECTOR CLASSIFICATION
1972-BASED MODEL

New DRI Sector	Description	*BEA/ I-O/FIM Sector	SIC Code
	AGRICULTURE, FORESTRY, AND FISHERIES		
1	Dairy Farm Products	010100	
2	Poultry & Eggs	010200	
3	Livestock	010300	
4	Cotton	020100	
5	Food Grains	020201	
6	Feed Grains & Grass Seed	020202, 020203	
7	Tobacco	020300	
8	Fruits & Nuts	020400	
9	Vegetables	020501	
10	Miscellaneous Crops	020502, 020503, 020702	
11	Oil Bearing Crops	020600	
12	Forestry & Fishery Products	030000	
13	Agricultural, Forestry & Fishery Services	040000	
	MINING		
14	Iron & Ferroalloy Ores Mining	050000	101, 106
15	Copper Ore Mining	060100	102
16	Metal Ores Mining, N.E.C.	060200	103-105, Pt. 108, 109
17	Coal Mining	070000	1111, Pt. 1112, 1211, Pt. 1213
18	Crude Petroleum & Natural Gas	080000	131, 132, Pt. 138
19	Stone/Clay Mining & Quarrying	090000	141-5, Pt. 148, 149
20	Chemical & Fertilizer Mineral Mining	100000	147
	CONSTRUCTION		
21	New Residential Single Family Housing	110101, 110501	Pt. 15, Pt. 17
22	New Residential Multifamily Housing	110102, 110103, 110104	Pt. 15-17
23	New Residential Additions & Alterations	110105	Pt. 15, Pt. 17
24	New Hotels, Motels, & Dormitories	110106, 110107	Pt. 15-17
25	New Industrial Buildings	110201	Pt. 15-17
26	New Commercial Buildings	110202, 110203 110204, 110205	Pt. 15, Pt. 17
27	New Religious Buildings	110206	Pt. 15, Pt. 17
28	New Educational Buildings	110207	Pt. 15, Pt. 17
29	New Hospital & Institutional Buildings	110208	Pt. 15, Pt. 17
30	New Telephone & Telegraph Facilities	110301	Pt. 16, Pt. 17

*The first 2 digits of BEA sector = FIM sector number.

New DRI Sector	Description	BEA/ I-O/FIM Sector	SIC Code
31	New Railroads	110302	Pt. 16, Pt. 17
32	New Electric Utility Facilities	110303	Pt. 16, Pt. 17
33	New Gas Utility Facilities	110304	Pt. 16, Pt. 17
34	New Petroleum Pipelines	110305	Pt. 16, Pt. 17
35	New Water Supply Facilities	110306	Pt. 16, Pt. 17
36	New Sewer Facilities	110307	Pt. 16, Pt. 17
37	New Highways & Streets	110400	Pt. 16, Pt. 17
38	New Farm Service Facilities	110502	Pt. 15, Pt. 17
39	New Oil & Gas Wells & Exploration	110503, 110504	Pt. 138, Pt. 108, Pt. 1112, Pt. 1213, Pt. 148
40	New Military Facilities	110505	Pt. 15-17
41	New Conservation & Development Facilities	110506	Pt. 15-17
42	New Construction, N.E.C.	110209, 110308, 110507, 110508	Pt. 15-17, Pt. 108, Pt. 1112, Pt. 1213, Pt. 148
43	Maintenance & Repair, Residential	120100	Pt. 15, Pt. 17
44	Maintenance & Repair, Other	120200	Pt. 15-17, Pt. 138
ORDNANCE AND ACCESSORIES			
45	Complete Guided Missiles	130100	3761
46	Ammunition, Except Small Arms, N.E.C.	130200	3483
47	Tanks & Tank Components	130300	3795
48	Small Arms	130500	3484
49	Small Arms Ammunition	130600	3482
50	Other Ordnance & Accessories	130700	3489
FOOD AND KINDRED PRODUCTS			
51	Meat Packing Plants	140101	2011
52	Other Prepared Meats	140102	2013
53	Poultry Dressing Plants	140103	2016
54	Poultry & Egg Processing	140104	2017
55	Creamery Butter	140200	2021
56	Cheese, Natural & Processed	140300	2022
57	Condensed & Evaporated Milk	140400	2023
58	Ice Cream & Frozen Desserts	140500	2024
59	Fluid Milk	140600	2026
60	Canned & Cured Seafoods	140700	2091
61	Canned Specialties	140800	2032
62	Canned Fruits & Vegetables	140900	2033
63	Dehydrated Food Products	141000	2034
64	Pickles, Sauces & Salad Dressings	141100	2035
65	Fresh or Frozen Packaged Fish	141200	2092
66	Frozen Fruits & Vegetables	141300	2037, 2038
67	Flour & Other Grain Mill Products	141401	2041
68	Cereal Preparations	141402	2043
69	Blended & Prepared Flour	141403	2045
70	Pet Food	141501	2047
71	Prepared Feed, N.E.C.	141502	2048
72	Rice Milling	141600	2044

New DRI Sector	Description	BEA/ I-O/FIM Sector	SIC Code
73	Wet Corn Milling	141700	2046
74	Bread, Cake & Related Products	141801	2051
75	Cookies & Crackers	141802	2052
76	Sugar	141900	2061, 2062, 2063
77	Confectionery Products	142001	2065
78	Chocolate & Cocoa Products	142002	2066
79	Chewing Gum	142003	2067
80	Malt Liquors	142101	2082
81	Malt	142102	2083
82	Wines, Brandy & Brandy Spirits	142103	2084
83	Distilled Liquor, Except Brandy	142104	2085
84	Bottled & Canned Soft Drinks	142200	2086
85	Flavoring Extracts & Syrups, N.E.C.	142300	2087
86	Cottonseed Oil Mills	142400	2074
87	Soybean Oil Mills	142500	2075
88	Vegetable Oil Mills, N.E.C.	142600	2076
89	Animal & Marine Fats & Oils	142700	2077
90	Roasted Coffee	142800	2095
91	Shortening & Cooking Oils	142900	2079
92	Manufactured Ice	143000	2097
93	Macaroni & Spaghetti	143100	2098
94	Food Preparations, N.E.C.	143200	2099
TOBACCO MANUFACTURERS			
95	Cigarettes	150101	2111
96	Cigars	150102	2121
97	Chewing & Smoking Tobacco	150103	2131
98	Tobacco Stemming & Redrying	150200	2141
TEXTILE & APPAREL			
99	Broadwoven Fabric Plants	160100	2211, 2221, 2231, 2261, 2262
100	Narrow Fabric Mills	160200	2241
101	Yarn Mills & Textile Finishing	160300	2269, 2281, 2282, 2283
102	Thread Mills	160400	2284
103	Floor Coverings	170100	2271, 2272, 2279
104	Miscellaneous Textile Products	170200-170600	2291-2295
105	Tire Cord & Fabric	170700	2296
106	Textile Goods, N.E.C.	170900, 171001, 171002	2297-2299
107	Hosiery & Knit Goods	180101-180203	2251-2254, 2259
108	Knit Fabric Mills	180300	2257, 2258
109	Apparel from Purchased Material	180400	231-8, 39996
110	Housefurnishings	190100, 190200	2391, 2392
111	Fabric Textile Products, N.E.C.	190300	2393-2397, 2399
LUMBER & WOOD PRODUCTS			
112	Logging Camps & Contractors	200100	2411
113	Sawmills & Planing Mills, General	200200	2421
114	Hardwood Dimension & Flooring	200300	2426
115	Special Product Sawmills, N.E.C.	200400	2429

New DRI Sector	Description	BEA/ I-O/FIM Sector	SIC Code
116	Millwork	200501	2431
117	Wood Kitchen Cabinets	200502	2434
118	Veneer & Plywood	200600	2435, 2436
119	Structural Wood Members, N.E.C.	200701	2439
120	Prefabricated Wood Structures	200702	2452
121	Wood Preserving	200800	2491
122	Wood Pallets & Skids	200901	2448
123	Particleboard	200902	2492
124	Wood Products, N.E.C.	200903	2499
125	Wooden Containers	210000	2441, 2449
FURNITURE AND FIXTURES			
126	Wood Household Furniture	220101	2511
127	Household Furniture, N.E.C.	220102	2519
128	Wood Television & Radio Cabinets	220103	2517
129	Upholstered Household Furniture	220200	2512
130	Metal Household Furniture	220300	2514
131	Mattresses & Bedsprings	220400	2515
132	Wood Office Furniture	230100	2521
133	Metal Office Furniture	230200	2522
134	Public Building Furniture	230300	2531
135	Wood Partitions & Fixtures	230400	2541
136	Metal Partitions & Fixtures	230500	2542
137	Venetian Blinds & Shades	230600	2591
138	Furniture & Fixtures, N.E.C.	230700	2599
PAPER & ALLIED PRODUCTS			
139	Pulp Mills	240100	2611
140	Paper Mills, Except Building Paper	240200	2621
141	Paperboard Mills	240300	2631
142	Envelopes	240400	2642
143	Sanitary Paper Products	240500	2647
144	Building Paper & Board Mills	240602	2661
145	Paper Coating & Glazing	240701	2641
146	Bags, Except Textile Bags	240702	2643
147	Miscellaneous Paper Products	240703-240706	2645, 2646, 2648, 2649
148	Paperboard Containers & Boxes	250000	265
PRINTING & PUBLISHING			
149	Newspapers	260100	2711
150	Periodicals	260200	2721
151	Book Publishing	260301	2731
152	Book Printing	260302	2732
153	Miscellaneous Publishing	260400	2741
154	Commercial Printing	260501	2751, 2752, 2754
155	Manifold Business Forms	260601	2761
156	Blankbooks & Looseleaf Binders	260602	2782
157	Greeting Card Publishing	260700	2771
158	Engraving & Plate Printing	260801	2753
159	Bookbinding & Related Work	260802	2789
160	Printing Trade Services	260502, 260803-260805	2791, 2793, 2794, 2795

New DRI Sector	Description	BEA/ I-O/FIM Sector	SIC Code
	CHEMICALS & ALLIED PRODUCTS		
161	Inorganic & Organic Chemicals	270100	2812, 2813, 2816, 2819 exc. 28195, 2865, 2869
162	Fertilizers	270201	2873, 2874
163	Fertilizers, Mixing Only	270202	2875
164	Agricultural Chemicals, N.E.C.	270300	2879
165	Gum & Wood Chemicals	270401	2861
166	Adhesives & Sealants	270402	2891
167	Explosives	270406	2892
168	Printing Ink	270403	2893
169	Carbon Black	270404	2895
170	Chemical Preparations, N.E.C.	270405	2899
171	Plastic Materials & Resins	280100	2821
172	Synthetic Rubber	280200	2822
173	Cellulosic Man-Made Fibers	280300	2823
174	Organic Fibers, Noncellulosic	280400	2824
175	Drugs	290100	2831, 2833, 2834
176	Soap & Other Detergents	290201	2841
177	Polishes & Sanitation Goods	290202	2842
178	Surface Active Agents	290203	2843
179	Toilet Preparations	290300	2844
180	Paints & Allied Products	300000	2851
	PETROLEUM AND COAL PRODUCTS		
181	Petroleum Refining & Related Products	310100	2911, 2992, 2999
182	Paving Mixtures & Blocks	310200	2951
183	Asphalt Felts & Coatings	310300	2952
	RUBBER AND PLASTICS PRODUCTS, N.E.C.		
184	Tires & Inner Tubes	320100	3011
185	Rubber & Plastics Footwear	320200	3021
186	Reclaimed Rubber	320301	3031
187	Fabricated Rubber Products, N.E.C.	320302	3069
188	Miscellaneous Plastic Products	320400	3079
189	Hose & Belting	320500	3041
	LEATHER & LEATHER PRODUCTS		
190	Leather Tanning & Finishing	330001	3111
191	Footwear, Cut Stock	340100	3131
192	Footwear, N.E.C.	340200	3142-3144, 3149
193	Leather Gloves & Mittens	340301	3151
194	Luggage	340302	3161
195	Leather Goods, N.E.C.	340303-5	3171, 3172, 3199
	GLASS, STONE, & CLAY PRODUCTS		
196	Glass & Products, Except Containers	350100	3211, 3229, 3231
197	Glass Containers	350200	3221
198	Cement, Hydraulic	360100	3241
199	Structural Clay Products	360200-360500	325
200	Pottery & Related Products	360600-360900	326
201	Concrete Block & Brick	361000	3271
202	Concrete Products, N.E.C.	361100	3272

New DRI Sector	Description	BEA/ I-O/FIM Sector	SIC Code
203	Ready-Mixed Concrete	361200	3273
204	Lime	361300	3274
205	Gypsum Products	361400	3275
206	Cut Stone & Stone Products	361500	3281
207	Abrasive Products	361600	3291
208	Asbestos Products & Sealing Devices	361700, 361800	3292, 3293
209	Minerals, Ground or Treated	361900	3295
210	Mineral Wool	362000	3296
211	Nonclay Refractories	362100	3297
212	Nonmetallic Mineral Products, N.E.C.	362200	3299
PRIMARY METALS			
213	Blast Furnaces & Steel Mills	370101	3312
214	Electrometallurgical Products	370102	3313
215	Steel Wire & Related Products	370103	3315
216	Cold Finishing Steel Shapes	370104	3316
217	Steel Pipe & Tubes	370105	3317
218	Iron & Steel Foundries	3702000	3321, 3322, 3324, 3325
219	Iron & Steel Forgings	370300	3462
220	Metal Heat Treating	370401	3398
221	Primary Metal Products, N.E.C.	370402	3399
222	Primary Copper	380100	3331
223	Primary Lead	380200	3332
224	Primary Zinc	380300	3333
225	Primary Aluminum	380400	3334
226	Primary Nonferrous Metals, N.E.C.	380500	3339
227	Secondary Nonferrous Metals	380600	3341
228	Copper Rolling & Drawing	380700	3351
229	Aluminum Rolling & Drawing	380800	3353, 3354, 3355
230	Nonferrous Rolling & Drawing, N.E.C.	380900	3356
231	Nonferrous Wire Drawing & Insulating	381000	3357
232	Aluminum Castings	381100	3361
233	Brass, Bronze & Copper Castings	381200	3362
234	Nonferrous Castings, N.E.C.	381300	3369
235	Nonferrous Forgings	381400	3463
FABRICATED METAL PRODUCTS			
236	Metal Cans	390100	3411
237	Metal Barrels, Drums & Pails	390200	3412
238	Metal Sanitary Ware	400100	3431
239	Plumbing Fittings & Trim	400200	3432
240	Heating Equipment, Except Electrical	400300	3433
241	Fabricated Structural Metal	400400	3441
242	Metal Doors, Sash & Trims	400500	3442
243	Fabricated Plate Work (Boilershop)	400600	3443
244	Sheet Metal Work	400700	3444
245	Architectural Metal Work	400800	3446

New DRI Sector	Description	BEA/ I-O/FIM Sector	SIC Code
246	Miscellaneous Metal Work	400901, 400902	3448, 3449
247	Screw Machine Products	410100	345
248	Metal Stampings	410200	3465, 3466, 3469
249	Cutlery	420100	3421
250	Hand & Edge Tools, N.E.C.	420201	3423
251	Hand Saws & Saw Blades	420202	3425
252	Hardware, N.E.C.	420300	3429
253	Plating & Polishing	420401	3471
254	Metal Coating & Allied Services	420402	3479
255	Miscellaneous Fabricated Wire Products	420500	3495, 3496
256	Steel Springs	420700	3493
257	Pipe Valves & Pipe Fittings	420800	3494, 3498
258	Metal Foil & Leaf	421000	3497
259	Fabricated Metal Products,N.E.C.	421106	3499
MACHINERY, EXCEPT ELECTRICAL			
260	Steam Engines & Turbines	430100	3511
261	Internal Combustion Engines, N.E.C.	430200	3519
262	Farm Machinery	440001	3523
263	Lawn & Garden Equipment	440002	3524
264	Construction Machinery	450100	3531
265	Mining Machinery, Except Oil	450200	3532
266	Oil Field Machinery	450300	3533
267	Elevators & Moving Stairways	460100	3534
268	Conveyors & Conveying Equipment	460200	3535
269	Hoists, Cranes & Monorails	460300	3536
270	Industrial Trucks & Tractors	460400	3537
271	Machine Tools, Metal Cutting	470100	3541
272	Machine Tools, Metal Forming	470200	3542
273	Special Dies, Tools, Accessories	470300	3544, 3545
274	Power Driven Hand Tools	470401	3546
275	Rolling Mill Machinery	470402	3547
276	Metalworking Machinery, N.E.C.	470403	3549
277	Food Products Machinery	480100	3551
278	Textile Machinery	480200	3552
279	Woodworking Machinery	480300	3553
280	Paper Industries Machinery	480400	3554
281	Printing Trades Machinery	480500	3555
282	Special Industry Machinery, N.E.C.	480600	3559
283	Pumps & Compressors	490100	3561, 3563
284	Ball & Roller Bearings	490200	3562
285	Blowers & Fans	490300	3564
286	Industrial Patterns	490400	3565
287	Power Transmission Equipment	490500	3566, 3568
288	Industrial Furnaces & Ovens	490600	3567
289	General Industrial Machinery, N.E.C.	490700	3569
290	Miscellaneous Machinery	500000	3592, 3599
291	Electronic Computing Equipment	510101	3573
292	Calculating & Accounting Machinery	510102	3574

New DRI Sector	Description	BEA/ I-O/FIM Sector	SIC Code
293	Typewriters	510200	3572
294	Scales & Balances	510300	3576
295	Office Machines, N.E.C.	510400	3579
296	Automatic Merchandising Machinery	520100	3581
297	Commercial Laundry Equipment	520200	3582
298	Refrigeration & Heating Equipment	520300	3585
299	Measuring & Dispensing Pumps	520400	3586
300	Service Industry Machinery, N.E.C.	520500	3589
ELECTRIC AND ELECTRONIC EQUIPMENT			
301	Electric Measuring Instruments	530100	3825
302	Transformers	530200	3612
303	Switchgear & Switchboard	530300	3613
304	Motors & Generators	530400	3621
305	Industrial Controls	530500	3622
306	Welding Apparatus	530600	3623
307	Carbon & Graphite Products	530700	3624
308	Electric Industrial Apparatus, N.E.C.	530800	3629
309	Household Cooking Equipment	540100	3631
310	Household Refrigerators & Freezers	540200	3632
311	Household Laundry Equipment	540300	3633
312	Electric Housewares & Fans	540400	3634
313	Household Vacuum Cleaners	540500	3635
314	Sewing Machines	540600	3636
315	Household Appliances, N.E.C.	540700	3639
316	Electric Lamps	550100	3641
317	Lighting Fixtures	550200	3645, 3646, 3647, 3648
318	Wiring Devices	550300	3643, 3644
319	Radio & Television Receiving Sets	560100	3651
320	Phonograph Records & Tape	560200	3652
321	Telephone & Telegraph Equipment	560300	3661
322	Radio & Television Communication Equipment	560400	3662
323	Electron Tubes	570100	3671, 3672, 3673
324	Semiconductors	570200	3674
325	Electronic Components, N.E.C.	570300	3675, 3676, 3677, 3678, 3679
326	Storage Batteries	580100	3691
327	Primary Batteries, Dry & Wet	580200	3692
328	X-Ray Apparatus & Tubes	580300	3693
329	Engine Electrical Equipment	580400	3694
330	Electrical Equipment, N.E.C.	580500	3699
TRANSPORTATION EQUIPMENT			
331	Truck & Bus Bodies	590100	3713
332	Truck Trailers	590200	3715
333	Motor Vehicles	590301	3711

New DRI Sector	Description	BEA/ I-O/FIM Sector	SIC Code
334	Motor Vehicle Parts & Accessories	590302	3714
335	Aircraft	600100	3721
336	Aircraft Engines & Engine Parts	600200	3724, 3764
337	Aircraft Parts & Equipment, N.E.C.	600350	3728, 3769
338	Shipbuilding & Repairing	610100	3731
339	Boatbuilding & Repairing	610200	3732
340	Railroad Equipment	610300	3743
341	Motorcycles, Bicycles & Parts	610500	3751
342	Travel Trailers & Campers	610601	3792
343	Mobile Homes	610602	2451
344	Transportation Equipment, N.E.C.	610700	3799
INSTRUMENTS AND RELATED PRODUCTS			
345	Engineering & Scientific Instruments	620100	3811
346	Measuring & Control Instruments	620200, 620300	382, exc. 3825
347	Surgical & Medical Instruments	620400	3841
348	Surgical Appliances & Supplies	620500	3842
349	Dental Equipment & Supplies	620600	3843
350	Watches & Clocks	620700	3873
351	Optical Instruments & Lenses	630100	3832
352	Ophthalmic Goods	630200	3851
353	Photographic Equipment and Supplies	630300	3861
MISCELLANEOUS MANUFACTURING			
354	Jewelry, Precious Metal	640101	3911
355	Jewelers Materials	640102	3915
356	Silverware & Plated Ware	640104	3914
357	Costume Jewelry	640105	3961
358	Musical Instruments and Parts	640200	3931
359	Toys and Sporting Goods	640300, 640400	3942, 3944, 3949
360	Office and Artists' Materials	640500	395
361	Miscellaneous Notions	640600, 640700	396
362	Miscellaneous Manufacturing, N.E.C.	640800, 640900 641000	399
TRANSPORTATION AND COMMUNICATION			
363	Railroads & Rail-Related Services	650100	40, 474, Pt. 4789
364	Passenger Transportation, N.E.C.	650200	41
365	Motor Freight	650300	42, Pt. 4789
366	Water Transportation & Related Services	650400	44
367	Air Carriers & Related Services	650500	45
368	Pipelines, Except Natural Gas	650700	46
369	Transportation Services, N.E.C.	650700	Pt. 47
370	Communications, Except Radio and Television	660000	48, Except 483
371	Radio and Television Broadcasting	670000	483

New DRI Sector	Description	BEA/ I-O/FIM Sector	SIC Code
UTILITIES			
372	Electric Utilities	680100	491, Pt. 493
373	Gas Utilities	680200	492, Pt. 493
374	Water & Sewer Services	680300	494-497, Pt. 493
TRADE			
375	Wholesale Trade	690100	50, 51
376	Retail Trade	690200	52-57, 59, 7396, 8042
FINANCE, INSURANCE, AND REAL ESTATE			
377	Banking	700100	60
378	Credit Agencies & Security Brokers	700200, 700300	61, 62, 67
379	Insurance Carriers & Agents	700400, 700500	63, 64
380	Owner-Occupied Dwellings	710100	NA
381	Real Estate	710200	65, 66, Pt. 1531
SERVICES, N.E.C.			
382	Hotels & Lodging Places	720100	Pt. 70
383	Miscellaneous Personal Services, N.E.C.	720200	Pt. 72, 762-764, Pt. 76
384	Beauty & Barber Shops	720300	723-724
385	Miscellaneous Business Services	730100	732-739, Pt. 76
386	Advertising	730200	731
387	Miscellaneous Professional Services	730300	81, Pt. 89
388	Eating & Drinking Places	740000	58, Pt. 70
389	Automobile Repair & Services	750000	75
390	Motion Pictures	760100	78
391	Amusement & Recreation Services	760200	79
392	Doctors & Dentists	770100	801-803, 8041
393	Hospitals	770200	806
394	Other Medical & Health Services	770300	074, 8049, 805, 807-809
395	Educational Services	770400	82
396	Nonprofit Organizations	770500	84, 86, 8922
397	Social Services, N.E.C.	770600-770900	83
GOVERNMENT AND OTHER			
398	U.S. Postal Service	780100	4311
399	Other Federal Government Enterprises	780400	NA
400	State & Local Government Enterprises	790300	Pt. 41

ADDITIONAL SECTOR DETAIL AVAILABLE

IN THE

DEFENSE ECONOMIC IMPACT MODELING SYSTEM

DRI SECTOR	SIC CODE	SECTOR NAME
229		Aluminum Rolling & Drawing
229A	3353	Aluminum Sheet, Plate and Foil
229B	3354	Aluminum Extended Products
229C	3355	Aluminum Rolling and Drawing, NEC
246		Misc Metal Work
246A	3448	Prefabricated Metal Buildings & Components
246B	3449	Miscellaneous Metal Work
248		Metal Stampings
248A	3465	Automotive Stampings
248B	3466	Crowns and Closures
248C	3469	Metal Stampings, NEC
273		Special Dies, Tools, Accessories
273A	3544	Special Dies and Tools, Die Sets, Jigs and Fixtures, and Industrial Molds
273B	3545	Machine Tool Accessories and Measuring Devices
325		Electronic Components, NEC
325A	3675	Electronic Capacitors
325B	3676	Resistors, for Electronic Applications
325C	3677	Electronic Coils, Transformers & Other Inductors
325D	3678	Connectors for Electronic Applications
325E	3679	Electronic Components, NEC

SKILL CATEGORIES INCLUDED WITHIN
DEFENSE ECONMIC IMPACT MODELING SYSTEM
SKILLED LABOR DEMAND MODEL*

APPENDIX IIA

	Aggregate Skill Categories
ENGINEERS	(1)
Aero-Astronautic Engineers	(2)
Chemical Engineers	(3)
Civil Engineers	(4)
Electrical Engineers	(5)
Industrial Engineers	(6)
Mechanical Engineers	(7)
Metallurgical Engineers	(8)
Mining Engineers	(9)
Petroleum	(10)
Engineers, NEC	(11)
LIFE AND PHYSICAL SCIENTISTS & MATHEMATICIANS	(12)
Chemists	(13)
Physicists	(14)
Biological & Medical Scientists	(15)
Life and Physical Scientists, NEC	(16)
Mathematicians and Statisticians	(17)
Mathematical Specialists, NEC	(18)
ENGINEERING AND SCIENCE TECHNICIANS	(19)
Civil Engineering Technicians	(20)
Drafters	(21)
Electrical and Electronic Technicians	(22)
Industrial Engineering Technicians	(23)
Mechanical Engineering Technicians	(24)
Engineering and Science Technicians	(25)
HEALTH WORKERS	(26)
Dentists	(27)
Nurses, professional	(28)
Physicians, medical & osteopathic	(29)
Other Health Professionals	(30)
Other Health Workers	(31)
TECHNICIANS, exc. Health, Science, and Eng.	(32)
Airplane Pilots & Flight Engineers	(33)
Air Traffic Controllers	(34)
Radio Operators	(35)
Technical Assistants, Library	(36)
Tool Programmers, Numerical Control	(37)
Tech., exc. health, science, and eng, NEC	(38)
COMPUTER SPECIALISTS	(39)
Computer Programmers	(40)
Computer Systems Analysts	(41)
SOCIAL SCIENTISTS & other professionals	(42)
Economists	(43)
All Other Social Scientists	(44)
Teachers	(45)

College and University Teachers	(46)
Elementary and Secondary School Teachers	(47)
Vocational Education Teachers	(48)
Teachers, NEC	(49)
Selected Writers, Artists, and Entertainers	(50)
Professional & Technical Workers, NEC	(51)
BUSINESS PROFESSIONALS AND STAFF	(52)
Managers, Officials, and Proprietors	(53)
Sales Workers	(54)
Clerical Workers	(55)
Computer, peripheral equipment operators	(56)
Computer operators	(57)
Peripheral EDP equipment operators	(58)
Secretaries, Typists and Other Office Machine Operators	(59)
CRAFT AND RELATED WORKERS	(60)
Construction Craft Workers	(61)
Electricians	(62)
Fitters, pipelaying	(63)
Plumbers and pipefitters	(64)
Refractory Materials Repairs	(65)
Shipwrights	(66)
Structural Steel Workers	(67)
Construction Craft Workers, NEC	(68)
Mechanics, Repairers, and Installers	(69)
Aircraft Mechanics	(70)
Auto Mechanics & Repairers	(71)
Data Processing Machine Mechanics	(72)
Diesel Mechanics	(73)
Electrical Instrument and Tool Repairers	(74)
Electric Motor Repairers	(75)
Engineering Equipment Mechanics	(76)
Instrument Repairers	(77)
Maintenance Mechanics, Repairers General Utility	(78)
Marine Mechanics and Repairers	(79)
Millwrights	(80)
Telephone Installers and Repairers	(81)
Mechanics, Repairers, and Installers, NEC	(82)
Metalworking Craft Workers, except mechanics	(83)
Blacksmiths	(84)
Boilermakers	(85)
Coremakers, hand, bench, floor	(86)
Forging Press Operators	(87)
Header Operators	(88)
Heat Treaters, Annealers, and Tenperers	(89)
Layout Markers, Metal	(90)
Machine Tool Setters, Metalworking	(91)
Machinists	(92)
Molders, metal	(93)
Molders, bench and floor	(94)
Molders, machine	(95)
All other molders, metal	(96)
Patternmakers, Metal	(97)
Punch Press Setters, Metal	(98)
Rolling Mill Operators and Helpers	(99)

Shear and Slitter Setters	(100)
Sheet-metal Workers and Tinsmiths	(101)
Tool and Die Makers	(102)
Metalworking Craft Workers, NEC	(103)
Printing Trades Craft Worders	(104)
Other Craft and Related Workers	(105)
Auxiliary Equipment Operators	(106)
Blue Colar Operators	(107)
Heavy Equipment Operators	(108)
Inspectors	(109)
Lens Grinders	(110)
Machine Setters, Plastic Materials	(111)
Patternmakers, Wood	(112)
Patternmakers, NEC	(113)
Shipfitters	(114)
Shipengineers	(115)
Testers	(116)
Craft and Related Workers, NEC	(117)
OPERATIVES	(118)
Assemblers	(119)
Aircraft Structure and Surface Assemblers	(120)
Electrical and Electronic Assemblers	(121)
Electro-mechanical Equipment Assemblers	(122)
Instrument Makers and Assemblers	(123)
Machine Assemblers	(124)
Assemblers, NEC	(125)
Metalworking Operatives	(126)
Drill Press and Boring Machine Operators	(127)
Electroplators	(128)
Grinding and Abrading Machine Operators Metal	(129)
Heaters, Metal	(130)
Lathe Machine Operators, Metal	(131)
Machine Tool Operators, Combination	(132)
Machine Tool Operators, Numerical Control	(133)
Machine Tool Operators, Tool Room	(134)
Milling and Planning Machine Operators	(135)
Pourers, Metal	(136)
Power Break and Bending Machine Ops., Metal	(137)
Punch Press Operators, Metal	(138)
Welders and Flamecutters	(139)
Metalworking Operatives, NEC	(140)
All Other Operatives	(141)
Batch Plant Operators	(142)
Blasters	(143)
Boring Machine Operators, Wood	(144)
Coil Finishers	(145)
Cutters, Machine	(146)
Cutters, Portable Machine	(147)
Cutter-finisher Operators, Rubber Goods	(148)
Die Cutters and Clicking Machine Operators	(149)
Drillers, Hand and Machine	(150)
Filers, Grinders, Buffers and Chippers	(151)
Furnance Operators and Tenders, Except Metal	(152)
Winding Operators, NEC	(153)
Wirers, Electronic	(154)

Operatives, NEC	(155)
SERVICE WORKERS	(156)
Food Service Workers	(157)
Selected Health Service Workers	(158)
Protective Service Workers	(159)
LABORERS	
Other Laborers, except farm	(160)
FARM WORKERS	
Farmers and Farm Workers	(161)

*Based on Bureau of Labor Statistics, National OES Matrices

Appendix IIB
Industry Categories Included Within Defense Economic Impact Modeling System Skilled Labor Demand Model*

	AGGREGATE INDUSTRY CATEGORY
LIVESTOCK	1
OTHER AGRICULTURAL PRODUCTS	2
FORESTRY & FISHERY PRODUCTS	3
AGR., FORESTRY & FISHERY SERVICE	4
IRON ORE MINING	5
NONFERROUS METAL MINING	6
COAL MINING	7
CRUDE PETROLEUM & NATURAL GAS	8
STONE & CLAY MINING & QUARRYING	9
CHEM & FERITLIZER MIN. MINING	10
NEW CONSTRUCTION	11
MAINTENANCE & REPAIR CONSTR.	12
ORDNANCE & ACCESSORIES	13
FOOD & KINDRED PRODUCTS	14
TOBACCO MANUFACTURES	15
FABRIC, YARN & THREAD	16
MISC. TEXTILE GOODS	17
APPAREL	18
MISC. FABRICATED TEXTILE PRODS	19
LUMBER & WOOD PRODUCTS	20
WOOD CONTAINERS	21
HOUSEHOLD FURNITURE	22
OTHER FURNITURE & FIXTURES	23
PAPER & ALLIED PRODUCTS	24
PAPERBOARD CONTAINERS & BOXES	25
PRINTING & PUBLISHING	26
CHEMICALS & PRODUCTS	27
PLASTICS & SYNTHETIC MATLS.	28
DRUGS, CLEANING & TOILET PREP.	29
PAINTS & ALLIED PRODUCTS	30
PETROLEUM REFINING & RELATED. PROD.	31
RUBBER & MISC. PLASTICS PROD.	32
LEATHER TANNING & FINISHING	33
FOOTWEAR & OTHER LEATHER PROD.	34
GLASS & GLASS PRODUCTS	35
STONE & CLAY PRODUCTS	36
PRIMARY FERROUS METALS	37
NONFERROUS METALS	38
METAL CONTAINERS	39
FAB. STRUCTURAL METAL PRODUCTS	40
SCREW MACHINE PROD. & STAMPINGS	41
OTHER FAB. METAL PRODUCTS	42
ENGINES & TURBINES	43
FARM & GARDEN MACHINERY	44

	AGGREGATE INDUSTRY CATEGORY
CONSTRUCTION & MINING MACHINERY	45
MATERIALS HANDLING MACHINERY & EQ.	46
METALWORKING MACHINERY & EQ.	47
SPECIAL INDUSTRY MACHINERY	48
GENERAL INDUSTRY MACHINERY	49
MISC. NONELECTRICAL MACHINERY	50
OFFICE, COMPUTING & ACCT. MACHINERY	51
SERVICE INDUSTRY MACHINES	52
ELECTRICAL MACHINERY	53
HOUSEHOLD APPLIANCES	54
ELECTRIC LIGHTING & WIRING EQ.	55
RADIO, TV, & COMMUNICATION	56
ELECTRONIC COMPONENTS & ACCESS.	57
MISC. ELECTRICAL MACHINERY & EQ.	58
MOTOR VEHICLES & EQUIPMENT	60
AIRCRAFT & PARTS	61
INSTRUMENTS & SUPPLIES	62
OPTICAL, OPTHALMIC & PHOTO EQ.	63
MISC. MANUFACTURING	64
TRANSPORTATION & WAREHOUSING	65
COMMUNICATION EXCLUDING RADIO & TV	66
RADIO & TV BROADCASTING	67
UTILITIES	68
WHOLESALE & RETAIL TRADE	69
FINANCE & INSURANCE	70
REAL ESTATE & RENTAL	71
PERSONAL SERVICES EXC. AUTO	72
BUSINESS SERVICES	73
EATING & DRINKING PLACES	74
AUTOMOBILE REPAIR & SERVICE	75
AMUSEMENTS	76
MISC. SERVICES	77
FEDERAL GOVERNMENT ENTERPRISES	78
FEDERAL GOVERNMENT	79
STATE AND LOCAL GOVERNMENT	80
PERSONAL HOUSEHOLDS	81

*Based on Bureau of Labor Statistics National OES Matrices

APPENDIX III

KEY PRIMARY PRODUCTS INCLUDED WITHIN
DEFENSE ECONOMIC IMPACT MODELING SYSTEM
STRATEGIC MATERIALS REQUIREMENTS MODEL*

	Strategic Material
ALUMINUM METAL GROUP	
Bauxite	(5)
Alumina	(3)
Aluminum	(2)
ALUMINUM OXIDE, CRUDE FUZED	(4)
ASBESTOS	
Amosite	(71)
Chrysolite	(72)
BERYLLIUM	
Beryl Ore	(64)
Beryllium Oxide, Ceramic Grade	(65)
Beryllium Metal	(66)
Beryllium Copper Master Alloy	(67)
CADMIUM	(6)
CHEMICAL AND METALLURGICAL CHROMIUM GROUP	
Chromite, Metallurgical Grade	(7)
Chromite, Chemical Grade	(10)
High carbon ferrochromium	(25)
Low carbon ferrochromium	(31)
Ferrochromium silicon	(17)
Chromium metal & other	(11)
CHROMITE, REFRACTORY GRADE ORES	(8)
COBALT	(9)
COLUMBIUM	(68)
COPPER	(13)
DIAMOND GROUP	
Diamond Dies	(15)
Industrial Diamond Crushing Bort	(14)
Industrial Diamond Stones	(16)
FLUORSPAR	
Acid grade	(20)
Acid grade & equivalents	(18)
Acid grade - hydroflouric acid	(19)
Cryolite	(12)
Hydrofluosilic Acid	(26)
Metallurgical Grade	(21)
Sodium Silico Fluoride	(45)
GRAPHITE	
Natural - Malagasy Crystalline	(23)
Natural - Ceylon	(22)
Natural - Other than Ceylon and Malagasy	(24)
IODINE	(28)
JEWEL BEARINGS	(30)
LEAD	(47)
MANGANESE DIOXIDE, BATTERY GRADE GROUP	
Natural	(42)
Synthetic (Electrolytic & Chemical grade)	(43)

MANGANESE METALS GROUP	
Manganese Ore, Chemical Grade	(40)
Metallurgical Manganese Ore	(41)
H.C.F. Manganese & Spiengeleisen	(38)
Medium & Low Carbon Ferromanganese	(32)
Silico Manganese	(56)
Manganese metal	(39)
MERCURY	(27)
MICA	
Muscovite film, first and second qualities	(34)
Muscovite splittings	(35)
Muscovite block, stained or better	(33)
Phlogopite block	(36)
Phlogopite splittings	(37)
MOLYBDENIUM, FERRO & DISULFIDE	(44)
NICKEL	(46)
PLATINUM GROUP METALS	
Iridium	(29)
Palladium	(48)
Platinum	(49)
PYRETHRUM	(50)
QUARTZ CRYSTALS	
Manufactured	(51)
Natural	(52)
RUBBER	(53)
SILICON CARBIDE, Crude	(55)
SILVER	(1)
TALC	(57)
TANTALUM	(69)
THORIUM NITRATE	(58)
TITANUIM GROUP METALS	
Rutile	(54)
Sponge	(59)
TUNGSTEN	
Tungsten Carbide Powder	(61)
Ferrotungsten	(62)
Tungsten Powder	(63)
VANDIUM GROUP	
Ferrovanadium & Vanadium pentoxide	(60)
ZINC	(70)

*Based on Department of Commerce first use after processing, material consumption data.